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Motivation Mediates the Perfectionism–Burnout Relationship:

A Three-Wave Longitudinal Study with Junior Athletes

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Abstract

Perfectionism in sports has been shown to predict longitudinal changes in athlete burnout. What mediates these changes over time, however, is still unclear. Adopting a self-determination theory perspective and using a three-wave longitudinal design, the present study examined perfectionistic strivings, perfectionistic concerns, autonomous motivation, controlled motivation, and athlete burnout in 141 junior athletes (mean age 17.3 years) over 6 months of active training. When multilevel structural equation modeling was employed to test a mediational model, a differential pattern of between- and within-person relationships emerged. Whereas autonomous motivation mediated the negative relationship that perfectionistic strivings had with burnout at the between- and within-person level, controlled motivation mediated the positive relationship that perfectionistic concerns had with burnout at the between-person level only. The present findings suggest that differences in autonomous and controlled motivation explain why perfectionism predicts changes in athlete burnout over time.

Keywords: perfectionism; athlete burnout, longitudinal study; self-determination theory; autonomous motivation; controlled motivation

Introduction

Athlete burnout is an extreme form of sport disaffection (Raedeke & Smith, 2001), the experience of which can have serious negative consequences, including reduced well-being and athletic performance, and eventually dropout from sport (Cresswell & Eklund, 2006b; Gustafsson, Kenttä, & Hassmén, 2011). Therefore, sport and exercise psychology has sought to identify factors that contribute to athlete burnout. A substantial body of research has demonstrated that athlete burnout is related to perfectionism in sports (see Hill & Curran, in press, for a review). What is more, a recent study employing a two-wave longitudinal design found that perfectionism predicted changes in athlete burnout over time (Madigan, Stoeber, & Passfield, 2015). What psychological processes mediated these changes, however, was not investigated. Findings from cross-sectional studies suggest that the quality of motivation mediates the perfectionism–burnout relationship (Appleton & Hill, 2012; Jowett, Hill, Hall, & Curran, 2013). For a proper test of mediation, however, studies employing a three-wave longitudinal design are required (Cole & Maxwell, 2003). Consequently, the present study employed a three-wave longitudinal design to investigate whether motivation mediated the perfectionism–burnout relationship in junior athletes.

Athlete Burnout

Athlete burnout is a multifaceted syndrome represented by three core symptoms (Raedeke

& Smith, 2001). The first is a reduced sense of accomplishment in terms of goals and achievement in sport. The second is a devaluation of one's involvement in sport. The final symptom is physical and emotional exhaustion beyond that normally associated with sports participation. These core symptoms are thoughts and feelings that are sustained over time, rather than momentary lapses. As such, burnout can have significant negative implications for athletes. A number of theories have been proposed to explain the development of burnout including stress- and commitment-based models (see Cresswell & Eklund, 2006a, for a review). Of these, Smith's (1986) cognitive-affective model has received the greatest amount of empirical support. This model suggests that burnout is the product of chronic psychosocial stress. Consequently, personal factors that put athletes at risk for experiencing higher levels or more prolonged episodes of stress may contribute to athletes' developing symptoms of burnout. Because perfectionism is associated with harsh and excessive criticism, the sporting domain is regularly appraised as highly stressful (Flett & Hewitt, 2006) so there is ample opportunity for perfectionistic athletes to develop debilitating outcomes such as athlete burnout (Appleton, Hall, & Hill, 2009).

Perfectionism

Perfectionism is a personal disposition characterized by striving for flawlessness and setting exceedingly high standards of performance accompanied by tendencies for overly critical evaluations of one's behavior (Flett & Hewitt, 2002). Consequently perfectionism is best conceptualized as a multidimensional characteristic (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991). Factor analytic studies have provided support for two higher-order dimensions: *perfectionistic strivings* reflecting perfectionist personal standards and a self-oriented striving for perfection and *perfectionistic concerns* reflecting concerns about making mistakes, feelings of discrepancy between one's standards and performance, and fears of negative evaluation and rejection by others if one fails to be perfect (see Stoeber & Otto, 2006, for a review).

Differentiating between perfectionistic strivings and perfectionistic concerns is important when investigating perfectionism in sports. Whereas the two dimensions are positively correlated, they show different, and often opposite, patterns of relationships with various outcomes. Perfectionistic concerns are consistently associated with negative processes and outcomes (e.g., maladaptive coping, negative affect), whereas perfectionistic strivings are often associated with positive processes and outcomes (e.g., adaptive coping, positive affect), or inversely with negative processes and outcomes, particularly when the overlap with perfectionistic concerns is controlled

for (Gotwals, Stoeber, Dunn, & Stoll, 2012: Stoeber, 2011). Furthermore, perfectionistic strivings in athletes have been linked to other positive motivational tendencies (e.g., hope of success and approach goals), whereas perfectionistic concerns have been linked to other negative motivational tendencies (e.g., fear of failure and avoidance goals; Stoeber & Becker, 2008; Stoeber, Stoll, Salmi, & Tiikkaja, 2009).

Still, both dimensions of perfectionism have the potential to be associated with athlete burnout. The high standards associated with perfectionistic strivings may have an energizing effect on achievement striving and may therefore be neutral or even adaptive in the burnout process (Stoeber & Otto, 2006), whereas the unrealistic standards that may also be associated with perfectionistic strivings may be maladaptive in the burnout process (Hall, 2006). The self-criticism, negative reactions, and concerns captured by perfectionistic concerns may predispose athletes high in perfectionistic concerns to chronic stress that may precede burnout (Hill et al., 2008). The findings of empirical studies support these assumptions, but suggest perfectionistic strivings and perfectionistic concerns show a differential pattern of relationships with athlete burnout. For example, a recent meta-analysis of predominantly cross-sectional studies controlling for the overlap between the two perfectionism dimensions, found perfectionistic concerns to be positively related to athlete burnout, whereas perfectionistic strivings was negatively related (Hill & Curran, in press). The same pattern of relationships has been found longitudinally. For example, Madigan et al. (2015) examined a sample of junior athletes over a period of three months and found that only perfectionistic concerns predicted longitudinal increases in athlete burnout, whereas perfectionistic strivings predicted longitudinal decreases. Taken together, these findings illustrate the importance of differentiating between the two dimensions of perfectionism when investigating their relationships with athlete burnout.

Autonomous and Controlled Motivation

Madigan et al.'s (2015) study made a significant contribution to the literature demonstrating that perfectionism predicted longitudinal changes in athlete burnout. However, the study did not address the question of what psychological processes were responsible for these changes or, in other words, what psychological processes "mediated" these changes (Baron & Kenny, 1986; Preacher, 2015).

Findings from cross-sectional studies indicate that the quality of motivation may mediate the relationship between perfectionism and burnout (Appleton & Hill, 2012; Jowett et al., 2013). In this, self-determination theory (Deci & Ryan, 1985), while not a theory of burnout per se, may

provide a useful framework from which to investigate these relationships (Cresswell &Eklund, 2005b, 2006a). Self-determination theory postulates that an individual's level of self-determined motivation is reflected by the extent to which the individual's behavior is regulated by processes that are congruent with the self. Ryan and Deci (2000) suggest that a continuum of behavioral regulations exists that ranges from high to low self-determination. This continuum represents two broad types of motivation: autonomous and controlled motivation. Autonomous motivation comprises intrinsic motivation (characterized by inherent interest and enjoyment), integrated regulation (characterized by congruence and awareness of reasons and goals being in synthesis with the self), and identified regulation (characterized by personal importance and conscious valuing of reasons for doing sport). In comparison, controlled motivation comprises introjected regulation (characterized by self-control and ego-involvement and by being motivated by internal rewards and punishments) and external regulation (characterized by compliance and being driven by external rewards and punishments). Self-determination theory includes a further form of motivation called "amotivation" (characterized by a lack of motivation and being indicative of helplessness).

Cross-sectional studies have shown that controlled motivation is positively related to athlete burnout whereas autonomous motivation shows a negative relationship with burnout (e.g., Appleton & Hill, 2012; Li, Wang, Pyun, & Kee, 2013). Longitudinal studies, however, suggest that the relationships may be more complex. Assessing the temporal ordering of motivation and athlete burnout, Lonsdale and Hodge (2011), when examining elite athletes over a period of four months, found that low levels of self-determination predicted increases in burnout over a period of four months. In contrast, Martinent, Decret, Guillet-Descas, and Isoard-Gautheur (2014), when examining table tennis players in intensive training centers over a period of two months, found reciprocal relationships suggesting that burnout predicted changes in amotivation, intrinsic motivation, and external regulation over time. The difference in findings may be due to differing periods studied. Whereas Lonsdale and Hodge (2011) assessed the constructs over a period of four months, Martinent et al. (2014) used a period of two months. Because the findings of Cresswell and Eklund (2005a) suggest that three months is the minimum duration required to observe noticeable changes in athlete burnout, the relatively short period used by Martinent et al. (2014) may have masked any increases in burnout as a result of increases in external regulation. The difference in findings may also be due to the differing age and performance level of the respective samples. Whereas Lonsdale and Hodge (2011) investigated the relationships in a

sample of elite New Zealand athletes (*M* age = 24 yrs), Martinent et al. (2014) investigated a sample of adolescent athletes (*M* age = 15 yrs). Because individual cognitive evaluations are key in determining whether contingencies such as financial rewards enhance or undermine self-determined motivation (Ryan & Deci, 2000), performance level may have been responsible for the discrepancy in findings. The motivation of adult elite athletes, who receive substantial financial inducements to compete in their sport, may differ in important ways from adolescent athletes who are unlikely to receive large financial rewards. In sum, there is conflicting evidence as to whether burnout precedes changes in motivation or vice versa. Therefore, further evidence is needed before firm conclusions can be drawn.

According to the two-factor model of perfectionism (Frost, Heimberg, Holt, Mattia, & Neubauer, 1993; Stoeber & Otto, 2006), the defining aspects of perfectionistic strivings are theoretically associated with a greater sense of personal control and choice that are similar to more autonomous regulations, whereas the defining aspects of perfectionistic concerns are theoretically closely related to controlled motivation. Consequently, we would therefore expect perfectionistic strivings to be positively associated with autonomous motivation, and perfectionistic concerns to be positively associated with controlled motivation (Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000). In particular, socially prescribed perfectionism (an externally motivated form of perfectionism focused on concerns about how others evaluate one's performance; Hewitt & Flett, 1991) and perfectionist concerns over mistakes are closely related to introjected and external regulation (Stoeber, Davis, & Townley, 2013; Stoeber, Feast, & Hayward, 2009), both of which are indicators of controlled motivation (Ryan & Deci, 2000). Empirical studies have confirmed this pattern of relationships. Specifically, perfectionistic concerns have shown positive relationships with controlled motivation, whereas perfectionistic strivings have shown positive relationships with autonomous motivation and (to a lesser degree) controlled motivation (e.g., Appleton & Hill, 2012; Jowett et al., 2013; Mouratidis & Michou, 2011).

Furthermore, it can be expected that autonomous and controlled motivation will mediate the perfectionism–burnout relationship in athletes. Appleton and Hill (2012), examining a sample of junior athletes, found that the negative cross-sectional relationship between self-oriented perfectionism (an internally motivated form of perfectionism focused on high personal standards of performance and an indicator of perfectionistic strivings; Hewitt & Flett, 1991) and burnout was mediated by intrinsic motivation. Jowett et al. (2013), also examining a sample of junior

athletes, found that the positive cross-sectional relationship between perfectionistic concerns and burnout was mediated by controlled motivation, and the negative cross-sectional relationship between perfectionistic strivings and burnout was mediated by autonomous motivation.

Both studies examining the mediation effect of motivation on burnout (Appleton & Hill, 2012; Jowett et al., 2013), however, had a major limitation in that they employed a cross-sectional design. A fundamental requirement for establishing mediation is that the potential cause must precede the outcome in time and, because mediation of X predicting Y via M involves at least two causal relations (viz. X → M and M → Y), three-wave longitudinal designs are required for a proper examination of mediation (Cole & Maxwell, 2003). Although cross-sectional studies have suggested mediation effects in the perfectionism–burnout relationships, Maxwell and Cole (2007) cautioned that such data can result in biased estimates of longitudinal relationships. It is therefore important that findings from cross-sectional studies of mediation are re-examined within longitudinal studies. In addition, previous longitudinal research of the perfectionism–burnout relationship (Madigan et al., 2015) has confounded between- and within-person effects (cf. Hamaker, Kuiper, & Grasman, 2015), which may have led to erroneous conclusions regarding the presence, predominance, and sign of causal influences, meaning that findings may not reflect the actual within-person (causal) mechanism. To address these issues, the present study employed multilevel structural equation modeling (Preacher, Zyphur, & Zhang, 2010) which allowed us to assess the individual contributions of each variable to athlete burnout as well as their relative stability over six months by portioning variance into between- and within-person components.

The Present Study

Against this background, the aim of the present study was to investigate whether autonomous and controlled motivation would mediate the perfectionism–burnout relationship in junior athletes over six months of active training (see Figure 1). Based on the two-factor theory of perfectionism (Frost et al., 1993; Stoeber & Otto, 2006), self-determination theory (Ryan & Deci, 2000), recent cross-sectional findings (e.g., Jowett et al., 2013), and Stoeber and Damian's (2016) mediation model, we expected controlled motivation to mediate the positive relationship between perfectionistic concerns and athlete burnout, and autonomous motivation to mediate the negative relationship between perfectionistic strivings and athlete burnout. In addition, we hypothesized that perfectionistic concerns would impair autonomous motivation. Whereas previous research found perfectionistic strivings to show positive bivariate correlations with controlled motivation, Jowett et al.'s (2013) findings suggest that—once the overlap with perfectionistic concerns is

controlled for—perfectionistic strivings are unrelated to controlled motivation. Consequently, we did not expect a significant path from perfectionistic strivings to controlled motivation (but still tested this path). Extending cross-sectional research, the study used multilevel structural equation modeling with three-waves to provide a first examination of longitudinal mediation at the between- and within-person level. Furthermore, because there is contradictory evidence as to whether burnout precedes motivation or vice versa, we tested a reciprocal model investigating whether burnout mediated the perfectionism–motivation relationship. Finally, whereas we did not expect amotivation to mediate the perfectionism–burnout relationship (cf. Stoeber & Damian, 2016), there is cross-sectional evidence that amotivation is associated with perfectionism and burnout (e.g., Appleton & Hill, 2012). Consequently, we also tested a model that included amotivation as a mediator of the perfectionism–burnout relationship (see Additional Analyses).

Method

Participants

A sample of 141 junior athletes (124 male, 17 female) was recruited at two sports academies (92 from one academy, 49 from the other) to participate in the present study. Sports academies are part of the United Kingdom's further education system. Their main purpose is to recruit and develop promising junior athletes by providing them with a professional coaching environment while they study alongside their sporting commitments. Academy athletes are selected based on their ability (competitive performance in trials to enter the academy) and regularly compete at a regional, national, or international level. Participants' mean age was 17.3 years (*SD* = 0.8; range = 16-19 years). Participants were involved in a range of sports (60 in soccer, 36 in rugby, 18 in basketball, 14 in athletics, and 13 in other sports [e.g., cycling, squash]) and trained on average 9.6 hours per week (*SD* = 5.6).

Procedure

The study was approved by the university's ethics committee. Informed consent was obtained from all participants. In addition, parental consent was obtained from participants below the age of 18 years (as per the ethics committee's recommendation). Questionnaires were distributed during training in the presence of the first author, or athletes completed an online version of the questionnaire (*n* = 84 completed the paper version, *n* = 57 the online version). Participants were administered all measures three times, each separated by three months: once in October (Time 1), once in January (Time 2), and then again in April (Time 3). These time points were chosen to enable us to monitor changes over (approximately) a season, capturing start, mid,

and end of season (for as many sports as possible). The three-month interval between waves was considered sufficient because previous research has shown that this time interval allows researchers to capture changes in athlete burnout during periods of active training (e.g., Cresswell & Eklund, 2005a; see also Madigan et al., 2015).

Measures

Perfectionism. To measure perfectionism, we followed a multi-measure approach (Stoeber & Madigan, in press) and used four subscales from two multidimensional measures of perfectionism in sport: the Sport Multidimensional Perfectionism Scale (SMPS: Dunn et al., 2006) and the Multidimensional Inventory of Perfectionism in Sport (MIPS; Stoeber, Otto, Pescheck, Becker, & Stoll, 2007). To measure perfectionistic strivings, we used two subscales: the MIPS subscale capturing striving for perfection (5 items; e.g. "I strive to be as perfect as possible") and the SMPS subscale capturing personal standards (7 items; e.g. "I have extremely high goals for myself in my sport"), and then standardized the scale scores before averaging them to measure perfectionistic strivings (cf. Dunkley, Zuroff, & Blankstein, 2003). To measure perfectionistic concerns, we also used two subscales: the SMPS subscale capturing concerns over mistakes (8 items; e.g., "People will probably think less of me if I make mistakes in competition") and MIPS subscale capturing negative reactions to imperfection (5 items; e.g., "I feel extremely stressed if everything does not go perfectly"), and again standardized the scale scores before averaging them to measure perfectionistic concerns. Scores on the four subscales have demonstrated reliability and validity in numerous studies (e.g., Chen, Kee, & Tsai, 2009; Dunn et al., 2006; Madigan, Stoeber, & Passfield, 2016). Moreover, both are reliable and valid indicators of perfectionistic strivings and perfectionistic concerns (e.g., Gotwals et al., 2012; Stoeber et al., 2009). Participants were asked to indicate to what degree each statement characterized their attitudes in their sport responding on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Motivation. To measure motivation, we followed Lonsdale and Hodge (2011) and used the Behavioral Regulation in Sport Questionnaire (BRSQ; Lonsdale, Hodge, & Rose, 2008). To measure autonomous motivation, we used three subscales: intrinsic motivation (4 items; "…because I enjoy it"), integrated regulation (4 items; "… because it's a part of who I am"), and identified regulation (4 items; "… because I value the benefits of my sport"), and then averaged the scale scores (Mouratidis & Michou, 2011). To measure controlled motivation, we used two subscales: introjected regulation (4 items; "… because I would feel like a failure if I quit") and external regulation (4 items; "… because if I don't other people will not be pleased with me"),

and then averaged the scale scores (Mouratidis & Michou, 2011). To measure amotivation, we used the amotivation subscale (4 items; "… but I wonder what's the point"). The BRSQ has been shown to be a reliable and valid measure of motivational regulation (e.g., Lonsdale et al., 2008). All items were preceded by "I participate in my sport …" and participants responded on a scale from 1 (*not at all true*) to 7 (*very true*).

Athlete burnout. To measure burnout, we used the Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001). The ABQ comprises three subscales capturing the key symptoms of athlete burnout: reduced sense of accomplishment (5 items; e.g., "I am not achieving much in my sport"), physical and emotional exhaustion (5 items; e.g., "I am exhausted by the mental and physical demands of my sport"), and devaluation (5 items; e.g., "I'm not into my sport like I used to be"). The subscales were combined to create a total score of athlete burnout (e.g., Hill, 2013; Madigan et al., 2015). The ABQ is the most widely-used measure of athlete burnout and has demonstrated reliability and validity in numerous studies (e.g., Cresswell & Eklund, 2005b; Lemyre, Roberts, & Stray-Gundersen, 2007; Lonsdale & Hodge, 2011). Participants were asked how often they experienced the symptoms described in the statements responding on a scale from 1 (*almost never*) to 5 (*almost always*).

Data Screening

We examined the reliability of the measures by computing Cronbach's alphas. All measures showed satisfactory reliability (alphas > .70; see Table 1). Because 17.2% of the data were missing (31 male participants did not provide data at Time 2 and Time 3), we used full information maximum likelihood (FIML) in Mplus 7.0 (Muthén & Muthén, 1998-2012) to estimate means, standard deviations, and bivariate correlations (see Table 1). FIML is recommended because it handles missing data adequately even when data are not missing at random (Graham, 2009). Finally, we conducted two Box's *M* tests to examine if the variance-covariance matrices showed any differences between academies and questionnaire type (i.e., paper vs. online). Because Box's *M* is highly sensitive to even minor differences, it is tested against a $p < .001$ significance level (Tabachnick & Fidell, 2007). All tests were nonsignificant with Fs < 1.40, ps > .004. Therefore, all further analyses were collapsed across academies and questionnaire type.

Analytic Strategy

First, we calculated means, standard deviations, and bivariate correlations for all variables (see Preliminary Analyses). Next, we conducted a repeated-measures ANOVA to determine if

there were mean changes in burnout over the course of the study.[1] Then, to examine whether it was appropriate to use a multilevel modeling approach, we calculated intraclass correlations for each variable. Finally, to examine whether motivation mediated the perfectionism–burnout relationship we employed multilevel structural equation modeling with the measurement occasions (Time 1-3) representing the within-person level nested within participants (between-person level) (Mackinnon, Kehayes, Clark, Sherry, & Stewart, 2014; Preacher et al., 2010). The between-person model represents the trait-like component that does not change across time points. This is best conceptualized as investigating whether the trait-like component of X correlates with the trait-like component of Y. The within-person model represents the state-like component that changes across time points. This model investigates change in variables specifically investigating if X changes whether Y also systematically changes. For example, a positive correlation suggests that when X increases over 3 months, Y also increases similarly over the 3 months (cf. Mackinnon et al., 2014). For the model we used manifest variables, and the hypothesized relationships are shown in Figure 1. Note that multilevel structural equation modelling not only allows to differentiate between- and within-person effects while testing mediation, but also has advantages over standard multilevel modeling in terms of bias and confidence interval coverage (Preacher et al., 2011).

Because Mardia's coefficient was 7.70 ($p < .001$) indicating significant deviations from multivariate normality, we used robust FIML estimation to test the model and the accompanying mean-adjusted chi-square test statistic that is robust to non-normality (Satorra & Bentler, 1994).[2] To evaluate model fit, we chose the following fit indices that minimize the impact of sample size: comparative fit index (CFI) and Tucker-Lewis index (TLI [also known as non-normed fit index, NNFI]; see Kline, 2005). Because it is recommended to examine a range of incremental and absolute fit indices (e.g., Hu & Bentler, 1999; MacCallum & Austin, 2000), we additionally

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[1]However, please note that sample means do not need to change over time for findings to reflect changes in individual differences (i.e., some participants may experience increases in burnout symptoms over time, others may experience decreases, while the overall mean of the sample remains unchanged).

[2]With the Satorra-Bentler chi-square, the usual normal-theory chi-square statistic is divided by a scaling correction to better approximate chi-square under non-normality. Please note, however, that such a scaled chi-square cannot be used for chi-square difference testing of nested models because a difference between two scaled chi-squares for nested models is not distributed as chi-square (Satorra & Bentler, 2010).

included the standardized root mean square residual (SRMR) and the root mean square error of approximation (RMSEA). Regarding the other indices, we used the following cut-off values (in parentheses) as benchmarks for acceptable model fit (CFI > .90, TLI > .90, SRMR < .10, RMSEA < .10; Marsh, Hau, & Wen, 2004) and good model fit (CFI > .95, TLI > .95, SRMR < .08, RMSEA < .08; Marsh et al., 2004). In addition, we used a Monte Carlo method to test the indirect effects as recommended by Preacher and Selig (2012; see also Rucker, Preacher, Tormala, & Petty, 2011). If the 95% confidence interval (CI) does not contain zero, the test can be considered significant at the $p < .05$ level (Lachowicz, Sterba, & Preacher, 2015).

Results

Preliminary Analyses

We first inspected the means and standard deviations of all variables (Table 1). The sample reported low-to-moderate levels of burnout over all time points which is in line with previous cross-sectional (e.g., Hill, 2013: $M = 2.16$; Jowett et al., 2013: $M = 2.13$) and longitudinal findings (e.g., Madigan et al., 2015: M [T1] = 2.37, M [T2] = 2.40). The sample also reported higher levels of autonomous than controlled motivation over all time points, which also is in line with previous research in sport (e.g., Jowett et al., 2013).

We then inspected the bivariate correlations between the variables (Table 1). All cross-sectional correlations were in line with previous findings from cross-sectional studies except that perfectionistic strivings did not show significant correlations with athlete burnout. As regards the longitudinal correlations, autonomous motivation was negatively correlated and controlled motivation was positively correlated with athlete burnout, as was expected. Furthermore, perfectionistic concerns were positively correlated with athlete burnout whereas perfectionistic strivings showed no significant bivariate correlations. In addition, perfectionistic strivings were positively correlated with autonomous motivation across most time-points and positively correlated with controlled motivation across two time-points, whereas perfectionistic concerns were positively correlated with controlled motivation across most time-points and positively correlated with autonomous motivation across two time-points.

Next, we examined if burnout showed mean changes over the course of the study using a repeated-measures ANOVA. The findings showed that there were significant changes in burnout over time (F[1, 109] = 1815.97, $p < .001$), subsequently supporting our assertion that the time-lag we employed was sufficient.

Main Analyses

Intraclass correlations. To determine the amount of variance attributable to the between person effects we calculated intraclass correlations for each variables which were as follows: Perfectionistic strivings = .81, perfectionistic concerns = .75, autonomous motivation = .62, controlled motivation = .78, athlete burnout = .49. As a rule, intraclass correlation coefficients above .05 suggest that data are suitable for multilevel structural equation modeling (Preacher et al., 2010). This therefore suggested that, whereas a large amount of variance is explained at the between-person level, there is substantial variance left to be explained at the within-person level, so multilevel structural equation modeling is justified.

Multilevel structural equation modeling. We then tested the model in Figure 1 using multilevel structural equation modeling. The model provided an acceptable-to-good fit to the data (χ^2 [4] = 17.74, $p < .01$, scaling factor = 1.13, CFI = .93, TLI = .91, $SRMR_{within}$ = .04, $SRMR_{between}$ = .03, RMSEA = .09).[3] In the between-person model, hypothesized paths were supported showing perfectionistic strivings positively predicted autonomous motivation, which in turn negatively predicted athlete burnout (see Figure 2). Perfectionistic concerns negatively predicted autonomous motivation and positively predicted controlled motivation. Controlled motivation positively predicted athlete burnout. All these were medium- to large-sized effects (Cohen, 1992). In the within-person model, perfectionistic strivings predicted increases in autonomous motivation, which in turn predicted decreases in athlete burnout. Both were small-sized effects. No other paths were significant.

Indirect effects. In the between-person model, perfectionistic strivings had a negative indirect effect on athlete burnout via autonomous motivation (indirect effect = –.26; 95% CI = –.31 to –.19). Perfectionistic concerns had a positive indirect effect on athlete burnout via autonomous motivation (indirect effect = .16; 95% CI = .09 to .21) and controlled motivation (indirect effect = .38; 95% CI = .30 to .42). In the within-person model, perfectionistic strivings had a negative indirect effect on athlete burnout via autonomous motivation (indirect effect = –.04; 95% CI = –.06 to –.02) whereas no other indirect effects were significant.

Additional Analyses

In additional analyses, we examined whether there were reciprocal relationships of athlete burnout mediating the perfectionism–motivation relationship. To this end, we adapted the model

[3]We additionally tested the models separately for each individual symptom of burnout, but the results were the same and so are not reported separately.

in Figure 1 by switching the positions of autonomous and controlled motivation with athlete burnout and probing paths from perfectionistic strivings and perfectionistic concerns to burnout and paths from burnout to autonomous motivation and controlled motivation (see Figure 3). The model provided an adequate fit to the data (χ^2 [8] = 28.61, $p < .01$, scaling factor = 1.48, CFI = .90, TLI = .75, $SRMR_{within}$ = .05, $SRMR_{between}$ = .15, RMSEA = .08). In both the between- and within-person models, perfectionistic strivings negatively predicted and perfectionistic concerns positively predicted burnout (see Figure 3). In the between-person model, burnout negatively predicted autonomous motivation and positively predicted controlled motivation. In the within-person model, burnout negatively predicted autonomous motivation only. As such, the results provide some evidence that the relationship may be reciprocal.

Finally, we examined whether amotivation played a role in the perfectionism–burnout relationship. To this end, we first included amotivation as an additional mediator in the model shown in Figure 2. Results showed that, whereas including amotivation as a mediator provided an adequate fit to the data (χ^2 [4] = 18.10, $p < .01$, scaling factor = 1.10, CFI = .94, TLI = .55, $SRMR_{within}$ = .03, $SRMR_{between}$ = .03, RMSEA = .09), all paths involving amotivation were nonsignificant. In the between-person model, the path coefficients were: perfectionistic strivings → amotivation ($\beta = -.23$, $p = .18$), perfectionistic concerns → amotivation ($\beta = .21$, $p = .16$), and amotivation → burnout ($\beta = .04$, $p = .66$). In the within-person model, the path coefficients were: perfectionistic strivings → amotivation ($\beta = -.04$, $p = .63$), perfectionistic concerns → amotivation ($\beta = .03$, $p = .78$), and amotivation → burnout ($\beta = .06$, $p = .40$). We then included amotivation as an additional outcome in the model shown in Figure 3. This model too provided an adequate fit to the data (χ^2 [12] = 31.33, $p < .01$, scaling factor = 1.43, CFI = .92, TLI = .80, $SRMR_{within}$ = .05, $SRMR_{between}$ = .13, RMSEA = .06), but again all paths involving amotivation were nonsignificant: in the between-person model, burnout → amotivation ($\beta = .13$, $p = .19$); and in the within-person model, burnout → amotivation ($\beta = .09$, $p = .22$). In sum, as was expected, amotivation did not play a role in the perfectionism–burnout relationship.

Discussion

The aim of the present study was to investigate whether the quality of motivation mediated the relationship between dimensions of perfectionism and athlete burnout over six months of active training. Providing a first investigation of full longitudinal mediation using a three-wave design and a sample of junior athletes, the study found that autonomous and controlled motivation mediated the perfectionism–burnout relationship, but a differential pattern of relationships was

found at the between- and within-person levels of analysis. At the between-person level, the positive relationship between perfectionistic concerns and athlete burnout was mediated by controlled motivation and autonomous motivation, whereas the negative relationship between perfectionistic strivings and burnout was mediated by autonomous motivation. At the within-person level, only the negative relationship between perfectionistic strivings and burnout was mediated by autonomous motivation, suggesting increases in perfectionistic strivings led to decreases in athlete burnout via increases in autonomous motivation.

The present study extends previous research on perfectionism, motivation, and burnout. First, the study shows that the mediation model Jowett et al. (2013) suggested based on their cross-sectional findings (proposing that autonomous and controlled motivation mediate the perfectionism–burnout relationship in athletes) was confirmed when longitudinal between-person relationships were examined. However, only the indirect negative effect of perfectionistic strivings on burnout via autonomous motivation was confirmed when longitudinal within-person relationships were examined. The findings suggest that results were more consistent with the hypotheses in the between-person model compared to the within-person model. That is, the relationships we found were consistent with the hypothesized model when all variables were modeled as unchanging, stable personality traits. Perfectionism is a relatively stable personality disposition and therefore exerts similar effects over time. Furthermore, the within-person relationships were generally smaller than the between-person relationships, suggesting that the between-person model was better at predicting outcomes than the within-person model. The reason for this may be that the trait-like components of perfectionism, motivation, and burnout covaried in the manner we hypothesized; however, the state-like changes in each variable did not covary as strongly once the trait-like variance was partialled out. Nevertheless, the ICCs showed that there is more variance to explain at the between-subjects level (49% to 81% of the variance), so the small effect sizes at the within-subjects level might instead reflect the relative stability of measured variables over a six-month period. Note, however, that the effect sizes of the relationships we found were consistent with previous research investigating perfectionism and longitudinal mediation (Mackinnon & Sherry, 2012). Further note that even small-sized effects matter when they accumulate over time (Prentice & Miller, 1992).

Second, the study corroborates previous findings that perfectionistic concerns in athletes are closely related to controlled motivation, whereas perfectionistic strivings are more closely related to autonomous motivation (e.g., Jowett et al., 2013; Mouratidis & Michou, 2011). Whereas some

studies found perfectionistic strivings and its indicators to be related to both autonomous and controlled motivation (e.g., Mouratidis & Michou, 2011), in the present study this was only the case when bivariate correlations were regarded, but not in the mediation analyses. In the bivariate correlations, perfectionistic strivings showed positive relationships with controlled motivation within waves (Time 1, Time 2) and between waves (between Time 1 and Time 2; see Table 1). In the mediation analyses, all paths between perfectionistic strivings and controlled motivation were nonsignificant. This suggests that the relationships perfectionistic strivings have with motivation may differ depending on whether bivariate relationships or multivariate relationships, controlling for the overlap between perfectionistic strivings and perfectionistic concerns (cf. Jowett et al., 2013), are regarded. In the mediation analyses, multivariate relationships were regarded, meaning that the effect of perfectionistic strivings in the mediation model (Figure 1) represents an effect of "pure perfectionistic strivings" (i.e., perfectionistic strivings minus the shared variance with perfectionistic concerns) (cf. Hill & Curran, in press). Thus, previous findings of perfectionistic strivings and controlled motivation need to be interpreted with caution because perfectionistic strivings may be motivationally ambivalent (autonomous *and* controlled) when their overlap with perfectionistic concerns is not controlled for. How does this "translate" to individual athletes? If we would take any two athletes from the present sample, the athlete with higher perfectionistic strivings would show higher autonomous and controlled motivation than the athlete with lower perfectionistic strivings. However, if we would take two athletes who had the same level of perfectionistic concerns, the athlete with higher perfectionistic strivings would show higher autonomous motivation (and no higher controlled motivation) than the athlete with lower perfectionistic strivings. Controlling for the overlap between perfectionistic strivings and perfectionistic concern is like holding perfectionistic concerns constant, and this allows us to examine the unique relationships of perfectionistic strivings; and the same goes for perfectionistic concerns.

The within-person model captured "state-like fluctuations" in variables which are attributable to the situation (e.g., the impact of unique situations and events that occurred in a given 3-month period that altered whether or not an athlete experienced changes in burnout). Given the young age of the sample, these state-like fluctuations might also reflect developmental changes in personality. These findings suggest that athletes who experience increases in their perfectionistic strivings may be less susceptible to experiencing burnout and that this effect may be due to increases in autonomous motivation. These findings are consistent with theory

suggesting that perfectionistic strivings are associated with a greater sense of personal control and choice. However, our findings also indicate that athletes experiencing changes in perfectionistic concerns do not necessarily experience changes in controlled motivation. Although perfectionistic concerns have been linked to external approval, our findings suggest that, contrary to theory, increased perfectionistic concerns do not necessarily lead to increased controlled motivation. As to why this may be the case, we can only speculate. It may be that concerns over mistakes and negative reactions to imperfection in sport involve some level of internalization that overrides the externally regulated aspects.

Given the within-person findings, what else may act to mediate the perfectionism–burnout relationship longitudinally? According to Smith's (1986) cognitive-affective model of burnout, burnout is the product of chronic psychosocial stress. Therefore factors related to stress may further explain these relationships. One such factor may be training distress. For example, a recent longitudinal study found that perfectionism predicted changes in training distress over time (Madigan, Stoeber, & Passfield, in press). Therefore, training distress may help further explain these relationships. In addition, motivation is a subtheory of self-determination theory, and therefore other elements of self-determination theory may serve to explain these relationships (e.g., basic needs satisfaction/thwarting). Recent empirical evidence shows that basic psychological need satisfaction and thwarting may help explain the perfectionism-athlete burnout relationship. For example, a cross-sectional study (Jowett, Hill, Hall, & Curran, 2016), examining a sample of junior athletes, found that lower need satisfaction and higher need thwarting mediated the positive cross-sectional association between perfectionistic concerns and burnout, whereas higher need satisfaction and lower need thwarting mediated the negative cross-sectional association between perfectionistic strivings and burnout. Future longitudinal research should, therefore, explore this possibility.

It should be noted that the present study also provided evidence for reciprocal relationships of athlete burnout mediating the perfectionism–motivation relationship. These findings are in agreement with research investigating the temporal relationships between motivation and burnout that found burnout to precede changes in motivation and motivation to precede changes in burnout (e.g., Lonsdale & Hodge, 2011; Martinent et al., 2014). Future research with more waves over a longer time period would allow for a further exploration of whether these reciprocal relationships persist over time.

Finally, as expected and in line with Stoeber and Damian (2016), amotivation did not serve

as a mediator of the perfectionism–burnout relationship. Whereas cross-sectional studies have shown that amotivation is associated with perfectionism and athlete burnout (e.g., Appleton & Hill, 2012), the findings of the present study question whether amotivation plays a role in the perfectionism–burnout relationship over time.

Limitations and Future Research

The present study has a number of limitations. First, with 141 athletes, the sample was relatively small. Thus, the study may have lacked statistical power to detect smaller effects (Cohen, 1992). Second, although longitudinal correlational studies can establish temporal relationships, they can only suggest (but not establish) causal relationships (Taris, 2000). Consequently, it is possible that a variable we did not include in our study was responsible for ("caused") the longitudinal relationships we found. Third, the dimensions of perfectionism were conceptualized in a specific way in the present study, therefore future studies may consider including other measures of perfectionism from different models of perfectionism (e.g., self-oriented and socially prescribed perfectionism; Hewitt & Flett, 1991) to explore whether it makes a difference how the two higher-order dimensions of perfectionism are measured. Fourth, the total burnout score we employed in the present study may obscure different levels of the three burnout symptoms between athletes and, while we did not find any differences when the symptoms were modeled individually, future research should take note that the relationships may not always be the same for each symptom. Fifth, the present findings may be restricted to junior athletes and may not generalize to older or professional athletes. For example, a larger within-person component might be expected in junior athletes, as perfectionism can show significant changes during adolescence (e.g., Damian, Stoeber, Negru, & Băban, 2013). Consequently, future studies should reinvestigate the longitudinal mediation effects we found with samples other than junior athletes. Finally, it is important to note that our intraclass correlations suggest all variables had substantive trait-like (between-person) and substantive state-like (within-person) variance. Consequently, future research needs to take into account for both levels of variance when investigating the perfectionism–burnout relationship longitudinally.

Conclusions

The present study makes an important contribution toward our understanding of the longitudinal interplay of perfectionism, motivation, and burnout in sports. Using a three-wave longitudinal design, the study is the first to show that the longitudinal relationship between perfectionism and athlete burnout is mediated by quality of motivation. Whereas autonomous

motivation meditated the negative relationship that perfectionistic strivings had with burnout at the between- and within-person level, controlled motivation mediated the positive relationship that perfectionistic concerns had with burnout at the between-person level. The present findings indicate that athletes who are high in perfectionistic strivings tend to have higher levels of autonomous motivation and show lower levels of burnout, whereas athletes who are high in perfectionistic concerns tend to have higher levels of controlled motivation and show higher levels of burnout. Furthermore, athletes whose perfectionistic strivings increased over the duration of the study also had increased autonomous motivation which subsequently resulted in decreased burnout and, therefore, may be a mechanism by which perfectionism exerts its effect on burnout. With this, the present study provides further evidence for the important role that different dimensions of perfectionism and quality of motivation play in explaining why some athletes may burn out while others continue to burn brightly.

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Table 1.

Descriptive Statistics, Cronbach's Alphas, and Bivariate Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Time 1															
1. Perfectionistic strivings															
2. Perfectionistic concerns	.54***														
3. Autonomous motivation	.35***	.01													
4. Controlled motivation	.17*	.39***	–.05												
5. Amotivation	–.06	.14	–.23**	.12											
6. Athlete burnout	–.04	.31***	–.42***	.41***	.11										
Time 2															
7. Perfectionistic strivings	.79***	.56***	.22**	.24**	–.05	–.01									
8. Perfectionistic concerns	.63***	.87***	.05	.38***	.02	.24**	.75***								
9. Autonomous motivation	.45***	.17*	.72***	.01	–.09	–.35***	.34***	.20*							
10. Controlled motivation	.34***	.56***	–.04	.82***	.08	.37***	.31***	.48***	.00						
11. Amotivation	–.15	.02	–.12	–.03	.67***	.11	–.18*	–.11	–.21*	.08					
12. Athlete burnout	–.14	.40***	–.25**	.43***	.14	.76***	–.06	.26**	–.25**	.40***	.13				
Time 3															
13. Perfectionistic strivings	.63***	.48***	.18*	.16	.03	.03	.85***	.66***	.29***	.18*	–.08	–.00			
14. Perfectionistic concerns	.50***	.68***	–.01	.32***	.10	.13	.68***	.81***	.15	.35***	–.03	.11	.75***		
15. Autonomous motivation	.22**	–.15	.60***	–.31***	–.15	–.33***	.05	–.11	.60***	–.36***	–.18*	–.28***	.11	–.06	
16. Controlled motivation	.10	.25**	–.14	.71***	.09	.36***	.14	.25**	–.18*	.73***	.14	.37***	.09	.18*	–.38***
17. Amotivation	–.09	.06	–.06	–.06	.60	–.07	–.12	–.04	–.12	.05	.78***	.09	–.02	.04	–.07
18. Athlete burnout	–.05	.32***	–.31***	.44***	.20*	.54***	–.01	.25**	–.32***	.48***	.17*	.67***	–.02	.19*	–.42***
M	0.00	0.00	5.18	3.02	2.40	2.29	–0.01	–0.03	5.46	3.26	2.75	2.36	–0.01	–0.02	5.48
SD	0.90	0.93	1.05	1.34	1.53	0.70	0.93	0.94	1.05	1.51	1.43	0.64	0.91	0.94	0.82
Cronbach's alpha	.79	.85	.87	.81	.90	.79	.87	.84	.85	.77	.86	.85	.80	.83	.74

(Table continued on next page)

(Table 1 continued)

Variable	16	17	18
16. Controlled motivation			
17. Amotivation	.11		
18. Athlete burnout	.37***	.09	
M	3.41	2.95	2.32
SD	1.32	1.25	0.59
Cronbach's alpha	.74	.78	.88

Note. $N = 141$. Time 2 = (three months later than Time 1), Time 3 = (three months later than Time 2). Perfectionistic strivings and perfectionistic concerns are calculated by combing standardized scores (see text for details). Scale scores were computed by averaging across items.

*$p < .05$. **$p < .01$. ***$p < .001$.

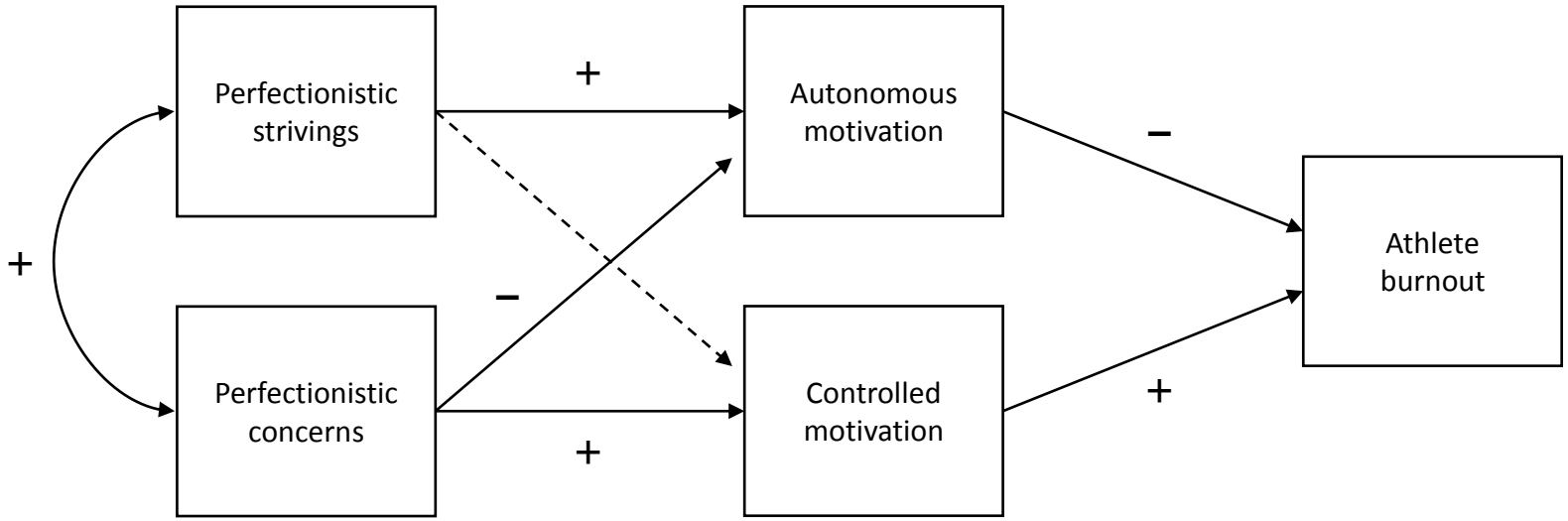

Figure 1. Hypothesized model for both between and within-person levels. For clarity, intercorrelations between autonomous and controlled motivation are not shown.

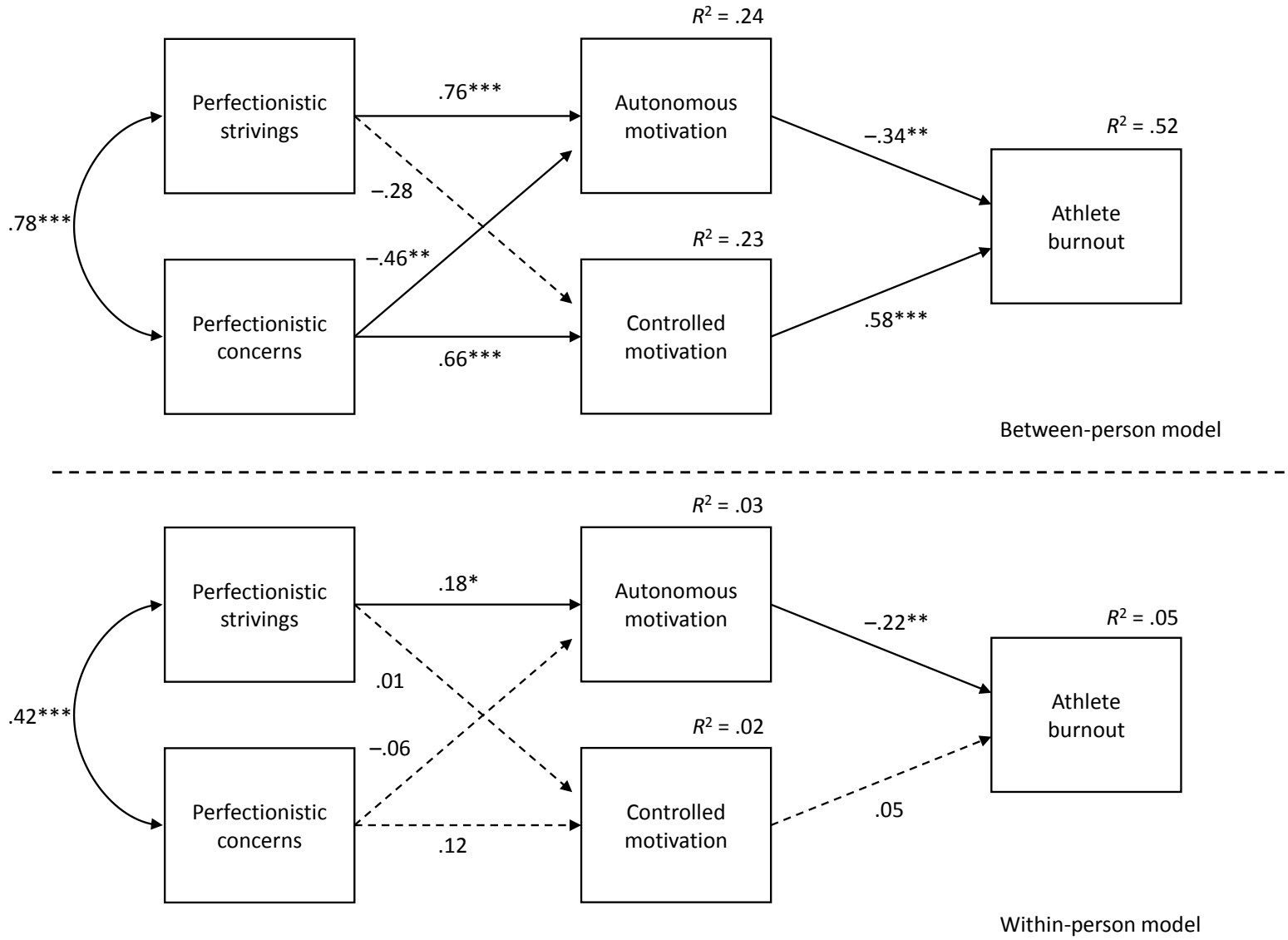

Figure 2. Empirical multilevel structural equation model (N = 141). Path coefficients are standardized. Dashed paths are nonsignificant (p > .05). Intercorrelations between autonomous and controlled motivation were nonsignificant in both the between-person (β = –.22) and the within-person model (β = .10). *p < .05. **p < .01. ***p < .001.

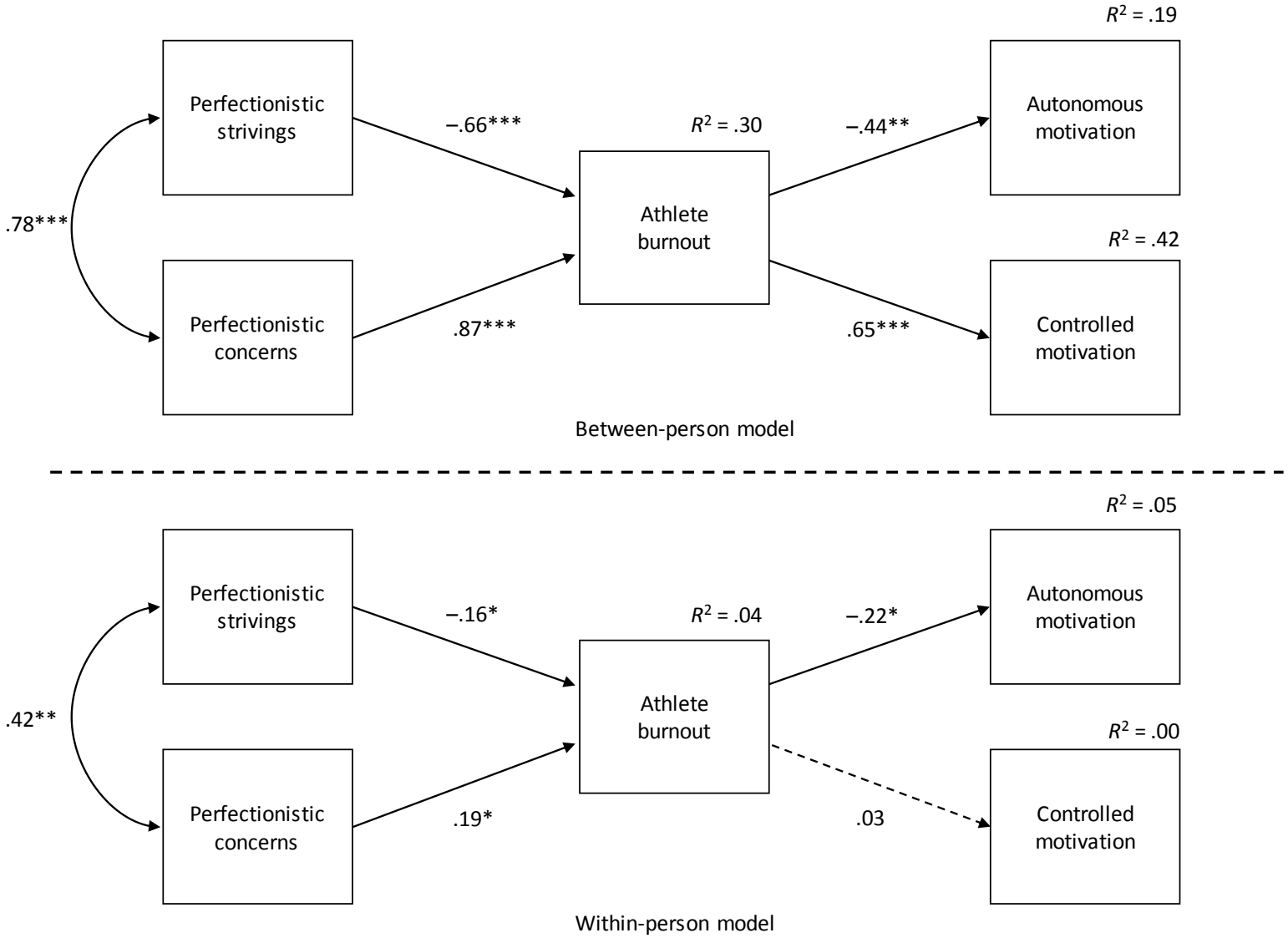

Figure 3. Additional multilevel structural equation model examining burnout as mediator (N = 141). Path coefficients are standardized. Dashed paths are nonsignificant ($p > .05$). Intercorrelations between autonomous and controlled motivation were nonsignificant in both the between-person (β = .12) and the within-person model (β = .12). *$p < .05$. **$p < .01$. ***$p < .001$.